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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	Confirmation No. 9076
David J. Cooperberg et al.	Group Art Unit: 1763
Application No.: 10/024,208	Examiner: Luz L. Alejandro Mulero
Filed: December 21, 2001	Appeal No.: Unassigned
For: TUNABLE MULTI-ZONE GAS INJECTION SYSTEM	

REPLY BRIEF

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Commissioner for Patents
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Sir:

This is a response to the Examiner's Answer mailed January 7, 2008. Appellants respectfully submit that each of the outstanding rejections should be reversed for at least the following reasons:

A. The Examiner's Answer Has Not Provided Any References or Evidence to Support the Statement that the Improved Gas Flow Performance Would Have been Expected

In considering the Declaration by inventor David J. Cooperberg under 37 C.F.R. § 1.132, the Examiner's Answer states that "it would have been expected that added controllability to the injector of Ni et al. would allow for improved controllability and better results with respect to different etching processes" (emphasis added) (Examiner's Answer at page 19, lines 14-18).

As stated in M.P.E.P. § 716.02(c)(II), "[e]xpected beneficial results are evidence of obviousness of a claimed invention, just as unexpected results are evidence of unobviousness thereof." *In re Gershon*, 372 F.2d 535, 538, 152 USPQ 602, 604 (CCPA 1967) (resultant decrease of dental enamel solubility accomplished by adding an acidic buffering agent to a fluoride containing dentifrice was expected based on the teaching of the prior art); *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Board concluding that beneficial results would have been expected because one of the references taught a claimed antioxidant is very efficient and provides better results compared with other prior art antioxidants.). However, in both *Gershon* and *Blanc*, beneficial results were determined to have been expected based on the teachings of a prior art reference. See M.P.E.P. § 716.02(c)(II).

In this case, the Examiner's Answer provides no citation or any additional evidence in support of the unsubstantiated statement that the improved gas performance "would have been expected" (Examiner's Answer at page 19, lines 14-18). Furthermore, to the extent that the Ni patent is considered the closest prior art, gas injector **22** provides no adjustability or control with respect to the gas flow ratio

between the on-axis and off-axis gas outlets. As such, Appellants submit the Examiner has not properly considered Appellants' rebuttal evidence of nonobviousness.

Furthermore, as stated in M.P.E.P. § 2143 (A), one rationale for a *prima facie* case of obviousness is that one of ordinary skill in the art could have combined the elements as claimed by known methods, and that in combination, each element merely performs the same function as it does separately.

In the present case, Appellants have provided rebuttal evidence, establishing that the elements in the claimed combination do not merely perform the function that each element performs separately. Instead, the results of the claimed combination are unexpected compared to the functionality of the Ni injector.

B. The Cited Combination Provides No Suggestion of a Conical Surface - Claim 7

The Examiner's Answer argues that FIGS. 3A-3C of Ni "clearly show conical surfaces" (Examiner's Answer at page 20, lines 6-8).

However, the Examiner's Answer has identified no disclosure in Ni of a gas injector having a "conical" side surface, much less also having off-axis outlets in such "conical" side surface. Ni discloses that the gas injector **22** has a "cylindrical body." (page 11, lines 7-8). Appellants also note that Ni discloses a "conical liner **30**" (page 10, lines 3-4), and consistent with the meaning of the word "conical"; the conical liner **30** has an increasing diameter in the vertically downward direction from the window **20**. Ni does not disclose any gas injector **22** having a "conical" outer surface, as this term should be properly understood. Absent any disclosure in Ni of a gas injector with a conical side surface, there is no basis for the ground of rejection of Claim 7.

Because the cited references do not teach all the claim features, a *prima facie* case of obviousness has not been established and Appellants respectfully urge reversal of the rejection of Claim 7 under 35 U.S.C. § 103(a). Dependent Claims 44 and 52 are patentable over the applied combination of references at least for the same reason as those discussed above regarding Claim 7.

C. The Cited Combination Does Not Disclose or Suggest Outlets in the Side Surface of a Gas Injector Which Inject Process Gas at an Acute Angle Relative to the Plane Parallel the Exposed Surface of the Substrate - Claims 1 and 42

In rejecting Claims 1 and 42, Examiner's Answer contends that "it would have been obvious ... to modify the apparatus of Ni et al. as to comprise the gas injector suggested by Murugesh et al. and Chang et al. in order to optimize the delivery of gases into the chamber" (Examiner's Answer at page 9, lines 3-8).

Even if the Ni, Chang and Murugesh were combined in the manner as suggested in the Examiner's Answer, the claim feature of outlets in the side surface of a gas injector which inject process gas at an acute angle relative to the plane parallel to the exposed surface of the substrate is still missing.

1. Ni and Chang Disclose Injecting Process Gas from a Bottom Surface of a Gas Injector

Ni discloses that gas injector **22** includes an on-axis outlet **46** and off-axis outlets **46** formed on the same bottom surface of gas injector **22** (FIG. 3A; page 11, lines 6-15). Likewise, Chang discloses a top gas nozzle **96** in fluid communication with gas source **100**a, and a top vent **98** surrounding the gas nozzle **96** and in fluid communication with the different gas source **100**b (page 9, lines 17-29). There are no gas outlets in a side surface of Chang's gas injector (FIGS. 1 and 7).

2. Murugesh Discloses Injecting a Cleaning Gas from a Side Surface of a Gas Distributor to Clean the Inner Surface of a Chamber Wall

The gas distributor structure shown in FIG. 3 of Murugesh is designed to direct different gases toward different surfaces (i.e., a substrate **25** and an inner surface of the chamber wall) in order to both process substrates and clean the chamber. Murugesh's structure includes a first gas distributor **65** with first gas outlets **85** and a second gas distributor **215** with second gas outlets **247** (column 8, lines 1-6). First gas distributor **65** supplies gas to process the substrate (column 4, lines 17-21). Second gas outlets **247** deliver cleaning gas toward the wall of chamber **30** to clean the chamber (column 8, lines 1-6).

Accordingly, the combination of Ni and Chang discloses injecting process gas from the bottom surface of a gas injector. Moreover, Murugesh discloses injecting cleaning gas, rather than process gas, from the side surface of a different gas distributor than the process gas distributor for cleaning the inner surface of the chamber wall. As such, the claim feature of outlets in the side surface of a gas injector which inject process gas at an acute angle relative to the plane parallel to the exposed surface of the substrate is still missing from the combination of Ni, Chang and Murugesh.

Because the cited references do not teach all the claim features, a *prima facie* case of obviousness has not been established and Appellants respectfully urge reversal of the rejection of Claims 1 and 42 under 35 U.S.C. § 103(a). Dependent Claims 2-6, 8, 11, 13-15, 39, 43, 48, 50 and 51 are patentable over the applied

combination of references at least for the same reasons as those discussed above regarding Claims 1 and 42.

D. Goodyear Teaches Away from a Common Gas Supply - Claims 1, 7, 9, 10, 41 and 42

Goodyear explicitly teaches away from an arrangement including a common gas supply, as follows:

> If an identical gas composition is fed via the lines **21** and **22**, the present inventors find that (even with adjustment of different flow rates in the separate supply lines **21** and **22**) significant depletion of one reaction gas can occur in the plasma reaction in the gas phase and at the surface of the device substrate **4**(**14**) at a peripheral area of a large area electrode **11**, and so non-uniform deposition or etching occurs over the total area (emphasis added) (column 4, lines 48-56).

According to Goodyear, "[i]n many cases, severe process non-uniformities result if the present invention is not employed" (column 4, lines 63-64). Goodyear is directed to solving a problem caused by use of a common gas source in a showerhead electrode. According to Goodyear, the problem is that use of a common gas source causes non-uniform deposition or etching due to depletion of a gas composition ingredient.

1. The Examiner's Position

Despite the portions of Goodyear that teach away from using a "common gas supply," the Examiner's Answer responds that "the examiner disagrees with such a statement" (Examiner's Answer at page 17, lines 18-20). The Examiner's Answer further contends that even if Goodyear does teach away: (1) "the rejected claims do not require the common gas supplies identical gas composition to the gas lines"; and (2) "such limitation is directed to a method limitation instead of an apparatus limitation, and a recitation of the intended use of the claimed invention must result in

a structural difference between the claimed invention and the prior art" (Examiner's Answer, at pages 17-18, bridging paragraph).

2. The Examiner's Answer Has Improperly Disregarded the Portions of Goodyear that Teach Away from a Common Gas Supply

M.P.E.P. § 2145 provides that Office personnel should consider all rebuttal arguments and evidence presented by Applicants. See, e.g., *In re Soni*, 54 F.3d 746, 750, 34 USPQ2d 1684, 1687 (Fed. Cir. 1995) (error not to consider evidence presented in the specification). *C.f., In re Alton*, 76 F.3d 1168, 37 USPQ2d 1578 (Fed. Cir. 1996) (error not to consider factual evidence submitted to counter a 35 U.S.C. 112 rejection); *In re Beattie*, 974 F.2d 1309, 1313, 24 USPQ2d 1040, 1042-43 (Fed. Cir. 1992) (Office personnel should consider declarations from those skilled in the art praising the claimed invention and opining that the art teaches away from the invention.); *In re Piasecki,* 745 F.2d 1468,1472, 223 USPQ 785, 788 (Fed. Cir. 1984) ("[Rebuttal evidence] may relate to any of the *Graham* factors including the so-called secondary considerations."). As further stated in MPEP § 2141.02 (VI), a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

However, the Examiner's Answer makes no factual finding and instead states the unsupported conclusion that "the examiner disagrees" with the Appellants' argument (Examiner's Answer at page 17, lines 18-20). The Examiner's Answer fails to set forth any rationale why Appellants' interpretation of Goodyear's disclosure is

incorrect and for this reason alone, the rejection is untenable and should be reversed.

The Examiner also errs with regard to the contention that certain claim features can be ignored as "method" or "intended use" limitations. Claims 1, 7, 9, 10, 41 and 42 recite the claim feature of "a common gas supply in fluid communication with a first gas line and a second gas line" or "a common gas supply in fluid communication with a first gas passage and a second gas passage." The feature of "a common gas supply" is structural feature missing from the prior art. As illustrated in FIGS. 3A-3B of Applicants' specification, gas from a main gas supply **32** can be split by a T-connector **34** into two gas lines (or passages) (page 12, lines 5-8).

The claimed "common gas supply in fluid communication with a first gas line and a second gas line" or "common gas supply in fluid communication with a first gas passage and a second gas passage" are structural features. The contention in the Examiner's Answer that such features can be ignored as method limitations constitutes reversible error.

Accordingly, the Examiner's Answer improperly disregards claim limitations and rebuttal arguments regarding Goodyear's teaching away from a "common gas supply." Furthermore, Appellants' showing of secondary considerations overcomes any *prima facie* case of obviousness set forth in the Examiner's Answer. Appellants respectfully request reversal of the rejection of Claims 1, 7, 9, 10, 41 and 42 under 35 U.S.C. § 103(a). Dependent Claims 2-6, 8, 11, 13-15, 39, 40 and 43-53 are patentable over the applied combination of references at least for the same reason as those discussed above regarding Claims 1, 7, 9, 10, 41 and 42.

E. Conclusion

For the foregoing reasons, reversal of the rejections of Claims 1-11, 13-15 and 39-53 is respectfully requested.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: March 6, 2007 By: _____

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